LIGHTWEIGHT CONCRETE ON POROUS AGGREGATES

Turgaev J.A
doctor of philosophy of technical sciences (PhD) Karakalpak State University named after Berdakh

Bekkulov V.K Takhirjanov N.K
Tashkent State Transport University

Annotation. This article is devoted to lightweight concrete with porous aggregates. Varieties of porous aggregates of organic and mineral origin are given. The technology for producing lightweight concrete is considered, the main physical and technological properties of such concrete and the scope of their application for lightweight concrete are given.

Key words: lightweight concrete, porous aggregate, binder, strength, thermal conductivity, building material.

The intensive growth of the construction industry is the most developing sector of the economy of the Republic of Uzbekistan. This gives impetus to the development and use of new materials that can qualitatively improve the operation of future facilities, make them more energy efficient in terms of operation and ultimately reduce construction costs.

One of such solutions to improve the thermal insulation characteristics of future objects is the use of lightweight concrete and products based on it. Lightweight concrete and products made from it are fundamentally different from heavy concrete. its porous structure and low thermal conductivity make this concrete ideal for enclosing structures of future facilities. [1]

Let's consider the main advantages of lightweight concrete:

- low density leads to a reduction in the weight of the product, which reduces the cost of construction by an average of 20%;
- has low thermal conductivity, making the building more energy efficient in winter, as well as in summer periods of operation;
- good sound insulation properties and increased fire resistance.

All these qualities make this building material promising for use in the developing construction industry of the Republic of Uzbekistan.

Let's consider the main types of lightweight concrete; they are divided into cellular concrete obtained by swelling of a binder solution and concrete with porous aggregate. [2]

The recent history of cellular concrete based on and various additives began at the beginning of the 20th century with the invention by the Swedish architect A. Erikson of a technology for producing artificial stone with characteristics close to wood. In 1942, this material was called aerated concrete. Aluminum powder was used as a gas-forming agent.

Somewhat later, new technologies for foam concrete began to be introduced in Denmark, and in the 30s, methods were proposed for producing cellular concrete based on lime and ground quartz sand (depending on the method of pore formation, they were called gas silicate and foam silicate) with subsequent autoclave processing of molded products. The widespread use of cellular concrete based on the autoclave option for accelerating hardening was introduced in 1950 by prof. A.V. Volzhensky, P.I. Bozhenov and others. [3]

In our country, the development and use of cellular concrete has a relatively recent history; one of the leaders in this industry is the "YUTONG" plant, the first plant in the Republic of Uzbekistan for the production of aerated concrete blocks with a capacity of 450 thousand m^3, located in the city of Kibray.

Another promising direction in the development of lightweight concrete is the use of porous aggregates. The development of this material is closely related to the development of porous aggregates. The history of the development of porous aggregates goes back to ancient times, where we use crushed tuff in the form of crushed stone, lime and pozzolan. In 1904 Hyde. C. Obtained porous aggregate by firing clay shales. Mass production of such lightweight aggregates as expanded clay, agloporite, slag pumice, and perlite began in the 50s. In the 80s, the development of shungizite, obtained from clay shales, began to develop. The development of porous aggregates leads to the rapid growth of wall panels for housing construction; examples of such houses can serve as entire microdistricts in our republic. [4]

Based on the type of aggregates, such concretes are divided into organic, artificial and natural. Cement, lime, slag, polymer, etc. are used as binders for lightweight concrete. Depending on the volumetric mass, they can be thermal insulating up to 500 kg/m^3, structural-thermal insulating 500-1400 kg/m^3 and structural 1400-1800 kg/m^3.

In modern construction, structural and thermal insulating lightweight concrete is most often used. In low-rise construction they are used for the construction of walls, which provides high thermal and technical characteristics with relatively low weight. Structural lightweight concrete with porous aggregates is used for the construction of load-bearing walls. [5]

The development of lightweight aggregates in our republic gives a new impetus to the development of lightweight concrete. One of the leading ones is VERMITEXMIN LLC.

VERMITEXMIN LLC is the owner of two deposits where Vermiculite ore is mined and enriched to produce vermiculite concentrate - gold and silver.

The production is located in the Republic of Uzbekistan, producing more than 5,000 tons per year. 2500 tons of silver vermiculite, 2500 tons of golden vermiculite.

Vermiculite is a naturally occurring mineral used in agriculture, horticulture and construction, a clayey, micaceous material that is formed by the hydrothermal treatment of volcanic rocks or shales.

Vermiculite has all the properties of mica, namely it is a good electrical, heat and sound insulator. Vermiculite does not support combustion and does not melt up to a temperature of 1200°C, and therefore it is used as a filler for building boards intended to ensure fire safety.

In addition, vermiculite has thermal insulating properties, making it useful for use in construction.

Vermiculite is considered a safe material to use and contains no harmful chemicals and is odorless.

The development of this industry makes it possible to develop a wide variety of thermal insulation materials in our Republic.

Conclusions

By using lightweight concrete in construction, it is possible to significantly reduce the weight of the structure being built, which is very important during construction in seismological regions, which include our Republic. The construction of buildings from lightweight concrete increases the thermal and sound insulation characteristics of the building.

In general, the use of lightweight concrete and products based on it helps to achieve high cost savings, reduce labor intensity and increase the efficiency of production itself.

In this regard, the development of new types of cellular concrete is an urgent scientific and practical task.

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